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ABSTRACT

The present study was designed to determine whether previous experience with categorically related items would facilitate third and sixth grade children's recall of subsequent unrelated materials. Subjects were 24 children at each grade level. An additional aim was to see if such experience with taxonomic material would influence both the manner in which these subjects instructed first graders as well as the recall of these younger children. Some third and sixth graders were given alternating sort/recall trials with two sets of categorical items; other subjects received unrelated items. Following these trials, all children were given two sort/recall trials with unrelated materials. Each child then instructed a first grader concerning the memory task and the strategy he used. Examination of the third and sixth graders' data indicated that experience with taxonomic materials improved third graders' recall, facilitated their use of organization, and enhanced their strategy communication in teaching the first grader. For the sixth graders, the experience did not affect their recall, but did increase the probability of their giving strategy information to the first grader. Exposure to categorical materials may occur in the classroom and may contribute to the acquisition of organizational strategies in the child's natural environment. (Author/RH)

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# Children's Generation and Communication of Organizational Strategies

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Age related differences in children's performance in deliberate recall tasks have been associated with developmental changes in the use of mnemonic strategies such as organization. Examples of the effects of organization can be seen in the demonstrations of improved children's recall following training in the use of adult schemes to organize low-associated items (e.g., Bjorklund, Ornstein, & Haig, 1977) and instructions to organize materials on the basis of meaning (e.g., Corsale & Ornstein, 1977). The present study was designed to go beyond these training and instructional manipulations by exploring whether children's experience with categorically related items would facilitate (in a learning-set sense) their subsequent recall of unrelated items. An additional aim was to see if such experience with taxonomic materials would influence both the manner in which these subjects instructed still younger children in the memory task, and the recall performance of these younger children.

Informal observations in elementary school classrooms suggest that teachers often present materials to their children in an organized, categorized form. For example, social studies units on different cultures examine the foods the people eat or the tools they use. Such presentations may contribute to the child's acquisition of organizational strategies in the natural environment, since our observations suggest that direct instruction in strategy use probably does not occur frequently. From these observations, we decided to see if exposing children to materials in which the taxonomic relations

were gradually faded from highly associated items to less strongly associated ones would induce them to use organizational strategies when they were presented with unrelated materials.

The task we chose was a series of alternating sort/recall trials with different sets of to-be-remembered items. The sets were composed of 20 cards, each containing a picture with the name of the drawing indicated below. On the sorting phase of each trial, the children were instructed to make from 2 to 7 groups of the pictures so that they would be able to remember the pictures later. The categorical relationships of the items were not mentioned to the children and all of the item sets were presented in randomized order. The children were not asked to sort the items according to the categories or according to meaning. Rather, the aim was to see if the materials themselves would induce the subjects to use organized sorting patterns when asked to prepare for recall. All previously sorted items were visible to the child and free recall followed each sort.

Twenty-four third grade and 24 sixth grade children participated in the experiment, and at each age level two experimental conditions were established. These conditions varied according to the first two lists of stimulus materials which were presented to the subjects. The groups may be more easily understood if you will refer to the experimental design presented in Table 1. Children in the Categorized groups received one sort/recall trial with a set of highly associated categorical items, followed by two sort/recall trials with categorical items that were somewhat less strongly associated. These items were chosen using Posnansky's (1973) category association norms for children. In contrast to these groups, children in the Uncategorized groups received one sort/recall trial with a set of relatively "unrelated" items, followed by two sort/recall trials with a

different set of unrelated materials. Subjects in both conditions thus had three sort/recall trials, representing experience with two different lists of items. Following these three initial trials, both groups were given two final sort/recall trials with another set of unrelated items. In order to avoid list specific effects, two different unrelated lists were used for the final two trials, with half the subjects in each group receiving one list and the other half receiving the second list.

After the memory task, each subject was asked a battery of metamemory questions presented in the usual interview/question format and designed to assess several aspects of the child's metamemory knowledge, especially the usefulness of organization and grouping as strategies. These questions were derived from previous metamemory studies (Kreutzer, Leonard, & Flavell, 1975; Moynahan, 1973; Naus, Ornstein, & Denning, in preparation; Salatas & Flavell, 1976; Tenney, 1975). As a supplement to these traditional measures of metamemory, each subject was also asked to instruct a first grade child concerning performance on the sort/recall task, indicating the strategy he found helpful in remembering the pictures. The instructions these children gave to the first graders were considered to be an actual performance measure of metamemory which could then be examined in terms of the strategy information given. In addition, they could also be examined in terms of their usefulness for the first graders who received them and who were later requested to perform two sort/recall trials with unrelated materials.

The first three trials for the third and sixth graders were intended to provide them with exposure to either taxonomically related or unrelated sets of materials. The last two trials with a different set of unrelated items were considered to be of critical importance for testing the effects of this previous experience upon the children's performance. For these

reasons, the first three trials, called induction trials, were analyzed separately from the last two test trials, which were the critical test trials, and will be the primary focus of this paper.

Before we discuss the recall data, we would like to briefly discuss data from the sorting phase of the task. The sorting protocols for each group were examined using Johnson's hierarchical clustering procedure to determine the qualitative differences between the sorting patterns of the groups. The protocols for the first two lists of the Categorized groups indicated that both third and sixth graders perceived the taxonomic relationships between the items and sorted them accordingly, even though they had not been directly instructed to sort according to meaning. In contrast, the Unrelated groups showed much less agreement in the sorting patterns of the first two lists. The sixth graders, however, sorted the unrelated items into more consistent, meaningful groups than the third graders who did not show consistent, hierarchical patterns. Examination of the sorting protocols for the third unrelated lists suggested that third graders who had prior experience with categorized materials formed more meaningful groups than did third graders exposed to the unrelated materials. For the sixth graders, prior experience with categorized or uncategorized materials did not seem to affect their sorting patterns, since they sorted meaningfully in both situations.

The recall data for the first two lists of items are presented in Table 2, along with measures of clustering in recall. In all cases, clustering was examined in terms of the sorting patterns formed by the child, not according to the actual taxonomic categories of the materials. Analysis of the recall performance on the first two lists indicated that third and sixth graders' recall was similar with the categorized materials, but sixth graders recalled substantially more of the unrelated list items than did the third graders. Examination of the clustering scores in Table 2

indicated that this form of output organization was similar for the third and sixth graders with the categorized materials, but the sixth graders showed more organization than third graders with the unrelated materials.

The primary data of the study are the recall performance of the four groups on the two final trials with List 3, that is the unrelated items test list. Analysis of these data, also shown in Table 2, indicated that there was no difference between the sixth grade Categorized and Uncategorized groups, with means of 14.75 and 16.63 respectively. This suggests that these older children employed useful strategies regardless of the materials to which they had previously been exposed. Of major interest, however, was the fact that the third grade Categorized group recalled an average of 12.79 words which was significantly higher than the Uncategorized group average of 8.75 words on these critical trials. As can be seen in the table, the third grade and sixth grade Categorized groups were not substantially different in the mean number of items recalled on these last two trials. Thus, it appears that exposing third graders to taxonomically related materials was sufficient to increase their recall of unrelated items which were presented after the induction lists. Examination of the clustering scores of the four groups suggested that the superior recall of the third graders in the Categorized group was associated with higher levels of clustering in recall. These children clustered more than the Uncategorized group third graders, and in a manner similar to the two sixth grade groups.

Since the performance of the Categorized group of third graders suggested that they had used more organization in both their sorting patterns and in their recall, we were curious to see if they would give more organizational strategy information in their answers to the metamemory question and in their instructions to the first graders they taught in the teaching task. Eight of the 18 metamemory questions dealt specifically with the children's knowledge

of the usefulness of organizational strategies. These data revealed the usual age differences with the sixth graders giving more strategy information than the third graders. However, at both age levels, there were no differences between the Categorized and Uncategorized groups' answers. The age differences found may be a reflection of the way in which the information was elicited. For older children who are used to answering direct, introspective-type questions, the usual interview format of assessing metamemory may be more appropriate than for third graders who have had less experience. However, teaching another child to play a game is a naturally occurring activity for most all age groups, and as the social cognition literature suggests, when the "pupil" is younger, the "teacher" may attempt to be more explicit in the information provided.

For these reasons, we thought the teaching task might provide a better measure of metamemory knowledge, and we examined the instructions given by the older children. In order to do this, we recorded the instructions given to the first graders and developed a scoring code in which points were given for each rule or example which suggested organization or grouping. More sophisticated rules, such as taxonomic or functional ones, were given more points than less sophisticated ones, such as rhyming or grouping. For example, 3 points were given for a taxonomic or a functional rule, such as, "Put all the fruits together." Two points were given for rhyming rules, while one point was given for saying, "Make groups or pairs of the pictures." Appropriate examples that clarified the rule were given one point. Examination of the teaching task instructions presented in Table 3 indicated that both the third and sixth grade Categorized groups spontaneously gave more information concerning the usefulness of organizational strategies than did the Uncategorized groups. They instructed the first graders to create meaningful groups of the pictures even though they had never been told to do so themselves.

In addition, these instructions also seemed to influence the recall of the first graders who received them. The first graders instructed by third and sixth graders who had experience with categorized materials actually recalled more and clustered more items in their recall than peers instructed by children who had prior experience with unrelated items, as shown in Table 3.

We were concerned with the possibility that the Categorized groups, for some reason, might be more fluent in their instructions, but the data which we cannot describe now, did not indicate this. However, as an additional control for this, we had another group who was instructed by the experimenter, who, presumably, would present instructions in a fluent fashion. For these subjects, we used the original instructions that the children should sort items so that the groups formed would help them to remember. The first graders with Categorized group "teachers" recalled more than those given their instructions by the adult experimenter. Apparently, the instructions given by the Categorized groups were meaningful to the first graders and enhanced their performance of the task.

In conclusion, for third graders who were less likely to use organizational strategies spontaneously, experience with taxonomically related materials improved their recall, facilitated their use of organization, and enhanced strategy communication in teaching a younger child. For older children, the experience did not affect their recall, but it did increase the probability of their giving strategy information in the context of teaching a younger child. We believe that the present experiment has gone beyond the simple training studies by establishing conditions in which children can be induced to generate and use organizational strategies by themselves. These findings are important in regard to the way children probably acquire these strategies

in the natural environment, since it is doubtful that such strategies are directly taught in the classroom. Additionally, the present study suggests that actual performance measures of metamemory, such as the teaching task, may be more sensitive, meaningful ways to assess metamemory knowledge.

## References

Bjorklund, D. F., Ornstein, P. A., & Haig, J. R. Developmental differences in recall: training in the use of organizational techniques. Developmental Psychology, 1977, 13, 175-183.

Corsale, K., & Ornstein, P. A. Developmental changes in the use of information for recall. Paper presented at the meeting of the Psychonomic Society, Washington, D.C., November, 1977.

Kreutzer, M. A., Leonard, C., & Flavell, J. H. An interview study of children's knowledge about memory. Society for Research in Child Development Monographs, 1975, 40 (1, Ser. # 159).

Moynahan, E. D. The development of knowledge concerning the effect of categorization upon free recall. Child Development, 1973, 44, 238-246.

Naus, M. J., Ornstein, P. A., & Denning, L. Developmental changes in metamemory knowledge and memory performance. In preparation.

Salatas, H., & Flavell, J. H. Behavioral and metamnemonic indicators of strategic behaviors under remember instructions in first grade. Child Development, 1976, 47, 81-89.

Tenney, Y. J. The child's conception of organization and recall. Journal of Experimental Child Psychology, 1975, 19, 100-114.

Table 1. Experimental Design

| Materials | List 1 | List 2 | List 3 (test list) |
|---|---|---|---|
| No. sort/recall trials | 1 trial | 2 trials | 2 trials |
| Third Graders | | | |
| Categorized Group | Highly Associated Items | Lower Associated Items | Unrelated Items |
| Uncategorized Group | Unrelated Items | Unrelated Items | Unrelated Items |
| Sixth Graders | | | |
| Categorized Group | Highly Associated Items | Lower Associated Items | Unrelated Items |
| Uncategorized Group | Unrelated Items | Unrelated Items | Unrelated Items |

Table 2. Mean Recall and Mean Clustering (Bousfield & Bousfield (1966) Stimulus Category Repetition Measure) of the Third and Sixth Grade Children

| | List 1 | List 2 | List 3 |
|---|---|---|---|
| Third Graders | | | |
| Categorized Group | | | |
| Mean Recall | 15.50 | 13.63 | 12.79 |
| Clustering | 6.35 | 5.84 | 4.05 |
| Uncategorized Group | | | |
| Mean Recall | 10.90 | 9.34 | 8.75 |
| Clustering | 2.06 | .56 | 1.16 |
| Sixth Graders | | | |
| Categorized Group | | | |
| Mean Recall | 15.92 | 14.96 | 14.75 |
| Clustering | 4.75 | 6.29 | 4.29 |
| Uncategorized Group | | | |
| Mean Recall | 16.75 | 17.13 | 16.63 |
| Clustering | 6.05 | 6.73 | 6.79 |

Table 3. Strategy Information Provided to First Graders In The Instructions of the Teaching Task and the Recall Performance of the First Graders on the Task.

| Experimental Group of the "teacher" | Strategy Information | First Graders' performance on two sort/recall trials with unrelated materials: Mean Recall | Clustering |
|---|---|---|---|
| Third Grade | | | |
| Categorized | 5.83 | 9.50 | 1.23 |
| Uncategorized | 1.50 | 7.54 | .62 |
| Sixth Grade | | | |
| Categorized | 4.33 | 10.54 | 2.02 |
| Uncategorized | 2.83 | 8.71 | .00 |
| Adult Experimenter | 1.00 | 8.38 | .94 |